PATENTABILITY REMARKS

Claims 1, 2-5 and 7-20 as presently amended stand rejected under 35 USC 103(a) as being unpatentable over U.S. Publication 2003/0059991 to Teramoto et al in combination with applicant's admitted prior art, U.S. Publication 2004/0201874 to Yamazaki, U.S. Publication 2005/0148119 to Fujimura, U.S. Patent 4,584,025 to Takaoka et al and U.S. Publication 2003/0148565 to Yamanaka. All prior art rejections are respectfully traversed for at least the following reasons.

Since the final office action essentially refers to previous office actions for putative grounds for rejection, Applicant briefly reviews the previous prosecution. Specifically, in the July 12, 2005 office action the Examiner stated:

> With respect to claims 1, 2, 3, and 7, Teramoto et al. teach a method for manufacturing a semiconductor device comprising (see all disclosed figures and associated text, specifically fig. 12A and claims 17-19 and [0120]):
> 1) forming a semiconductor material layer 603 on a substrate 601;
> 2) irradiating at least a region of the semiconductor material layer with a laser for heating and melting the semiconductor material layer in the region; and
> 3) heating the semiconductor material layer to a temperature in a range of 500 C or higher or crystallization temperature (450-750 C) of the semiconductor layer.

In its obviousness contention for the independent claims, the July 12, 2005 office action further argued:

> Further with respect to claims 1, 2, 3, and 7, since Teramoto et al. teach the claimed proces that is irradiating the semiconductor material layer and subsequently heating the layer to a crystallization temperature of the semiconductor material layer, uniform cooling of the semiconductor material would inherently be promoted and a polysilicon microstructure would inherently be formed in the semiconductor material layer by lateral solidification from a boundary of the region.
> Further with respect to claims 3 and 12, Teramoto et al. teach providing a high thermal conductivity material or silicon nitride layer in proximity to the semiconductor material layer. See [0033]. Note that the presence of high thermal conductivity material or silicon nitride layer in proximity to the semiconductor material layer in Teramoto et al. reference would inherently spread heat in the region and promote uniform cooling in the region.

In response to this rejection, Applicant eventually amended independent claims 1, 2, and 3 (see March 2, 2006 Amendment After Final) to require specifically that the laser be an extended laser or a continuous wave laser.

In response to Applicant's March 2, 2006 argument, the Examiner agreed (on page 2 of the March 29, 2006 non-final office action) that

> Further with respect to presently amended claim 1, Teramoto et al. appear to fail to teach that laser is an extended laser or a continuous wave laser.

However, on the same page the Examiner recast his rejection by stating:

> AAPA teaches the use of extended laser to increase the length of crystal. See page 3, lines 8-15 of the Background of the invention of this application.
> It would have been obvious to one of ordinary skill in the art of making semiconductor devices to incorporate the teaching of AAPA into the method of Teramoto et al. to achieve the above benefit.

In the June 27, 2006 Amendment Applicant traversed this rejection. It appears from the September 11, 2006 office action that Applicant's traversal was either misunderstood or not sufficiently emphatic. In this regard, it appears that the Examiner treated Applicant's traversal as a mere argument that U.S. Publication 2003/0059991 to Teramoto et al is not properly combineable with the applicant's admitted prior art[1]. Although not combination is improper, the rejection falls for far more basic reasons.

Applicant stresses that the background portions cited in the office action and alleged to constitute admitted prior art do not teach what the office action contends. The passage on page 3, lines 8-15 in the specification of the present application refers to the crystal size by the SLS method, and explains that (in the conventional SLS method) the length of needle-like crystal increases, but the crystal width does *not* increase in the SLS method. Thus, page 3, lines 8-15 of the specification, refers to a conventional SLS method, and nowhere mentions a pulse duration extended laser or continuous wave laser.

According to the technology of Applicant's independent claim 1, on the other hand, a pulse duration extended laser or continuous wave laser is used to extend the laser pulse duration, whereby the temperature distribution of the laser irradiated region is facilitates the cooling temperature being uniform, suppressing occurrence of

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[1] The only new substantive comment in the September 11, 2006 office action concerning the independent claims stated (at the top of page 3 of the September 11, 2006 office action) that:

> Applicant's arguments filed 06/27/06 have been fully considered but they are not persuasive. See below.
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> In response to the applicant's arguments in the paragraph bridging pages 6 and 7 of the amendment dated 06/27/06, it is submitted that the prior art motivation or advantage may be different that that of applicants while still supporting a conclusion of obviousness. In Re Wiseman 201 USPQ 658 (CCPA); Ex Parte Obiaya 227 USPQ 58 (Bd. of App. 1985).

microcrystals, and resulting in longer and *wider* crystals (page 13, lines 25-28 and page 29, lines 11-19 in the specification of the present application).

In another background section (page 3, lines 25-26), Applicant's specification reads as follows: "Japanese Patent Application Publication 2000-244036 irradiates amorphous silicon, with a pulse duration extended laser or continuous laser." Japanese Patent Application Publication 2000-244036 in fact discloses a laser pulse generation device producing a polycrystalline thin film by annealing amorphous silicon with a laser, and comprises means for dividing the intensity of a laser pulse beam, means for adding an optical path length to one of the divided beams, means for dividing the other divided beam into a plurality of pulses, and the like ([00121], [0013]).

Japanese Patent Application Publication 2000-244036 thus does not relate to a crystallization method of melting the laser irradiated region completely in the thickness direction, or growing a crystal laterally from the interface between the irradiated region and non irradiated region towards the center of the irradiated region. Therefore, the noted background portion of Applicant's specification which refers to Japanese Patent Application Publication 2000-244036 has no relevance to the SLS method. Furthermore, since Japanese Patent Application Publication 2000-244036 is itself silent concerning crystal size, the background portion of Applicant's specification found on page 3, lines 25-26) does not teach or suggest usage of a pulse duration extended laser or continuous wave laser as means for obtaining a large grain size, and certainly not uniformly increased crystal length and width (as required, e.g., by claim 20). There is no basis from the mention of Japanese Patent Application Publication 2000-244036 in Applicant's specification or in Japanese Patent Application Publication 2000-244036 itself that would lead a person skilled in the art to infer that a pulse duration extended laser or continuous wave laser would be employed in an SLS method.

Thus, page 3, lines 8 – 15 of the Background portion of the specification does not provide any teaching or suggestion of an extended laser or a continuous wave laser. Nor does the language on page 3, lines 25 – 26 of the specification concerning JP 2000-244063 and irradiating "amorphous silicon with a pulse duration extended laser or continuous laser" have anything to do with the SLS method or is there any basis that it would.

In view of the foregoing and other considerations, all claims are deemed in condition for allowance. Accordingly, Applicant respectfully requests that all prior art rejections be withdrawn. A formal indication of allowability is earnestly solicited.

The Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,
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